

Title (en)  
PRODUCTION OF MALIC ACID

Title (de)  
HERSTELLUNG VON ÄPFELSÄURE

Title (fr)  
PRODUCTION D'ACIDE MALIQUE

Publication  
**EP 3969465 A4 20220824 (EN)**

Application  
**EP 20841483 A 20200715**

Priority  
• IN 201921028680 A 20190716  
• IN 202021009475 A 20200305  
• IN 2020050608 W 20200715

Abstract (en)  
[origin: WO2021009774A1] A method of production of malic acid includes treating a first intermediate product to form a second intermediate product. The treating includes substantially removing impurities from the first intermediate product to obtain a treated intermediate product by gas stripping the crude maleic anhydride, or subjecting a mixture of one or more of the crude maleic acid, the crude fumaric acid, and the vent gas scrubber solution obtained from a phthalic anhydride production process or a maleic anhydride production process to crystallization, passing an aqueous solution of the treated intermediate product through a carbon column to substantially remove retained impurities to form the second intermediate product, obtaining a feed that includes the second intermediate product, and causing the feed to undergo hydration reaction in a tubular reactor or a continuous stirred tank reactor to produce malic acid.

IPC 8 full level  
**C07C 51/367** (2006.01); **C07C 51/087** (2006.01); **C07C 51/43** (2006.01); **C07C 51/47** (2006.01); **C07C 57/145** (2006.01); **C07C 57/15** (2006.01); **C07C 59/245** (2006.01); **C07D 307/60** (2006.01)

CPC (source: EP KR US)  
**C07C 51/087** (2013.01 - EP US); **C07C 51/367** (2013.01 - EP KR US); **C07C 51/43** (2013.01 - EP); **C07C 51/47** (2013.01 - EP KR); **C07C 59/245** (2013.01 - KR); **C07D 307/60** (2013.01 - EP)

C-Set (source: EP US)  
EP  
1. **C07C 51/087** + **C07C 57/145**  
2. **C07C 51/43** + **C07C 57/145**  
3. **C07C 51/47** + **C07C 57/145**  
4. **C07C 51/087** + **C07C 57/15**  
5. **C07C 51/43** + **C07C 57/15**  
6. **C07C 51/47** + **C07C 57/15**  
7. **C07C 51/367** + **C07C 59/245**  
US  
1. **C07C 51/367** + **C07C 59/245**  
2. **C07C 51/43** + **C07C 57/145**  
3. **C07C 51/43** + **C07C 57/15**  
4. **C07C 51/265** + **C07C 63/16**  
5. **C07C 51/215** + **C07C 57/145**  
6. **C07C 51/313** + **C07C 63/16**  
7. **C07C 51/313** + **C07C 57/145**

Citation (search report)  
• [YD] US 3379757 A 19680423 - WINSTROM LEON O, et al  
• [Y] US 1900649 A 19330307 - JAEGER ALPHONS O  
• [Y] IN 201621024815 A 20160826  
• [Y] US 3141037 A 19640714 - HARRY OLENBERG, et al  
• [Y] DATABASE CAPLUS [online] CAS; 1968, BZHASSO N. A. ET AL: "Malic acid", XP055943734, Database accession no. 69:86383  
• See also references of WO 2021009774A1

Designated contracting state (EPC)  
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

Designated extension state (EPC)  
BA ME

DOCDB simple family (publication)  
**WO 2021009774 A1 20210121**; CA 3144222 A1 20210121; CA 3144222 C 20240123; CN 114026112 A 20220208; EP 3969465 A1 20220323; EP 3969465 A4 20220824; EP 3969465 B1 20240904; JP 2022532319 A 20220714; JP 7186313 B2 20221208; KR 20220044901 A 20220412; TW 202112713 A 20210401; TW 1828930 B 20240111; US 11613512 B2 20230328; US 2022048845 A1 20220217; ZA 202201939 B 20221130

DOCDB simple family (application)  
**IN 2020050608 W 20200715**; CA 3144222 A 20200715; CN 202080045124 A 20200715; EP 20841483 A 20200715; JP 2021565840 A 20200715; KR 20217041732 A 20200715; TW 109124015 A 20200716; US 202117452735 A 20211028; ZA 202201939 A 20220215